

# **OC 7167L LINEARIZER**

## **Owner's Manual**

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## Vor dem Einschalten

Überzeugen Sie sich, ob Ihre Sendung das richtige Gerät Orbit Controls Modell OC 7167L beinhaltet, einschliesslich einer Betriebsanleitung OC 7167L.

Vor dem Einschalten des Gerätes überprüfen Sie die Anschlüsse und die Versorgungsspannung. Ein falsch angeschlossenes Gerät kann beschädigt werden und damit auch die mitverbundene Folgeelektronik. Für falsche Handhabung wird jede Haftung abgelehnt.

### ZU BEACHTEN

*Dieses Gerät wurde sorgfältig verpackt. Falls es bei Ihnen in beschädigtem Zustand eintrifft, benachrichtigen Sie unverzüglich den Orbit Controls Kundendienst (Tel: +41 1 730 2753 oder Fax: +41 1 730 2783) und nehmen Sie einen Schadenrapport auf, welchen Sie auch von der Transportgesellschaft unterschreiben lassen. Bewahren Sie bitte das Verpackungsmaterial für eventuelle Reklamationen auf.*

## Unpacking Instructions

Remove the Packing List and verify that you have received all equipment, including the following:  
Orbit Controls Model OC 7167L.

Operator's Manual OC 7167L.

If you have any questions about the shipment, please call the Orbit Controls Customer Service Department.

### NOTE

*When you receive the shipment, inspect the container and equipment for signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the Orbit Controls customer service, Phone +411 730 2753 or Fax +411 730 2783 and to the shipping agent.*

*The carrier will not honor damage claims unless all shipping material is saved for inspection. After examining and removing contents, save packing material and carton in event the reshipment is necessary.*

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# PROGRAMMABLE LINEARIZER OC7167L

- ✓ **6 digit display scalable**
- ✓ **Input 0-1V or customized**
- ✓ **Look-up Table with 100 points**
- ✓ **RS 232 Communication**
- ✓ **Analog Outputs 4-20mA, 0-10V**
- ✓ **Orbcom - Windows Soft Manager**



Orbit Controls Model OC7167L is a programmable 6 digit Linearizer with fast analog output. The process parameters are set with the keyboard at the instruments front. The linearizing table is created at the PC and loaded to the instrument via the serial data port by using the Soft Manager Orbcom. Analog outputs 0-10V and 4-20mA are generated simultaneously and can be assigned to any two display values.

By using the Soft Manager Orbcom the momentary measured values can be send to the PC and stored in the Windows files. The linearizing tables can be created at the PC and send to OC7167L to be stored in its internal memory. Apart of this, the stored linearizing table can be transferred from the instrument to the PC, stored there or modified upon demand and resend back to OC7167L.

The OC7167L menu can be opened with the keyboard or with the serial data port. The parameters can be modified on demand. The menu contains settings of the analog outputs, the serial data ports and the linearizing table with 101 points. The menu is locked with a password.

## 1 SPECIFICATIONS

ADC:	0...1VDC internal converter.
Input:	0-10VDC customized or any other upon demand.
Display:	6 digit, 7 segments red, 15m display size
Analog Output:	0-10V and 4-20mA can be assigned to any two display values. The delay is 9ms by using the <b>tAb</b> and 5ms by using the <b>EqdtAb</b> linearizing methods. Resolution 12 bit.
Tempco:	Temperature coefficient 50ppm/K
Scale:	Multiplicative constant programmable from $\pm 0.00001$ to $\pm 9.99999$ .
Set:	Display offset programmable.
Linearizing:	Table with 101 points. Selection between <b>tAb</b> and <b>EqdtAb</b> , see §10.
Data Port:	Isolated RS 232 and RS485 with 8 Bit, 1 Start, 1 Stop, No Parity, 1200 to 19200 bd. The address 0 activates RS232; one of addresses 1-31 activates RS485.
Communication:	ORBCOM - Soft Manager for Windows.
Password:	Password is used for locking the menu.
Resolution:	The menu step OrdEr determines the number of decimal points at the display.
Supply:	115V/230V $\pm 10\%$ , 50-60Hz. Option DC supply 9-36V DC.
Cabinet:	DIN 48 x 96 mm, depth 150 mm. Panel cut-out 45 x 93 mm.
Terminals:	Pluggable screw terminals

## 2 LINEAR CHARACTERISTIC and LINEARIZING TABLES

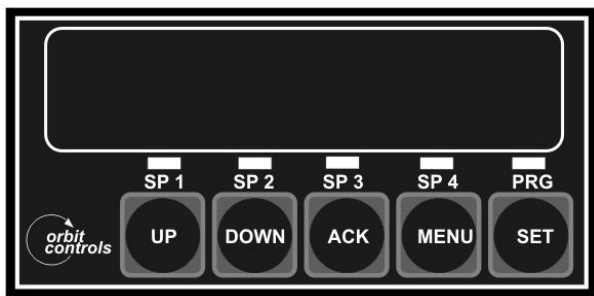
The menu **Fn Lin** contains linear characteristic **Lin** and two linearizing tables **tAb** and **EqdtAb**. To display the input signal with the linear characteristic, select **SCALE** for **1000** and **OrdEr** for **CCCCC**. The input measuring range is now scaled for 0...1000 at the display.

The linearizing of non-linear signals can be performed with a table **tAb** or **EqdtAb** with up to 101 points. The table contains X and Y coordinates. The X-coordinates are the input voltage; the Y coordinates are the linearized display values. The table is created at the PC and transferred to OC7167L via the serial data port. It is important to define always both values X and Y while creating the table. The table can have the Y values increasing and decaying. The linearizing methods are described in § 10.

## 3 SWITCHING-ON

After the power is switched-on, the display shortly reads the SW revision. After this it switches into the measuring mode and activates the stored linearizing table.

## 4 KEYBOARD



### KEY FUNCTIONS

<b>UP</b>	Setting of parameters or of the decimal point in the programming mode.
<b>DOWN</b>	Setting of parameters or of the sign in the programming mode.
<b>ACK</b>	Acknowledgement of the parameter. Positioning of the cursor in the programming mode.
<b>MENU</b>	Opens and scrolls the menu.
<b>SET</b>	Closes the menu and starts the measuring mode.

## 5 MENU

The menu will be opened with the key **MENU**. With the same key the submenu will scroll at the display. The required parameter will be confirmed with **ACK**. Its value can be set with **UP** or **DOWN**. The flashing digit - Cursor - can be positioned with **ACK**. The sign and the decimal point can be set when the flashing digit is positioned outside of the display range (no digit flashing). The decimal point will be adjusted with **UP**, the sign with **DOWN**.

<b>PASS</b>	The correct Password permits the entry into the menu and adjusting of the parameters. The menu is inhibited when incorrect password is used.	<u>Factory setting <b>P 1001</b></u>
<b>AOUt L</b>	Display value for analog output 0V, 4mA.	<u>Factory setting <b>000000</b></u>
<b>AOUt H</b>	Display value for analog output +10V, 20mA.	<u>Factory setting <b>001000</b></u>
<b>Fn dAC</b>	Function of the analog output: <b>OFF</b> deactivated <b>Anl LH</b> direct acting <b>Anl HL</b> inverted	<u>Factory setting <b>An LH</b></u>
<b>FnLin</b>	Function of the transfer characteristic: <b>Lin</b> Linear characteristic <b>tAb</b> or <b>EqdtAb</b> Linearizing tables	<u>Factory setting <b>tAb</b></u>
<b>OrdEr</b>	Display resolution. Selection from C.ddddd to CCCCCC, where <b>d</b> is the number of decimal points.	<u>Factory setting <b>CCCCC</b>.</u>
<b>SCALE</b>	Multiplicative constant (Scale) of the display. Selection from 0.00001 to ± 999999.	<u>Factory setting <b>000001</b>.</u>

<b>SEt</b>	Preset (Offset). Selection from 0.00001 to $\pm 999999$ .	<u>Factory setting <b>000000</b>.</u>
<b>Fn dSp</b>	Display function	<u>Factory setting <b>An</b></u>
<b>bAUd</b>	Baud Rate	<u>Factory setting <b>9600</b></u>
<b>rS SEL</b>	Selection of the data port	<u>Factory setting <b>rS 232</b></u>
<b>St PASS</b>	Selection of the Password form 20 stored combinations.	<u>Factory setting <b>P1001</b></u>

## 6 OUTPUTS

One serial data port and two analog outputs are generated from the display readings. The analog outputs 0-10V and 4-20mA are generated simultaneously. The serial data port is installed for the communication with the Soft Manager Orbcom and for creating of the linearizing tables.

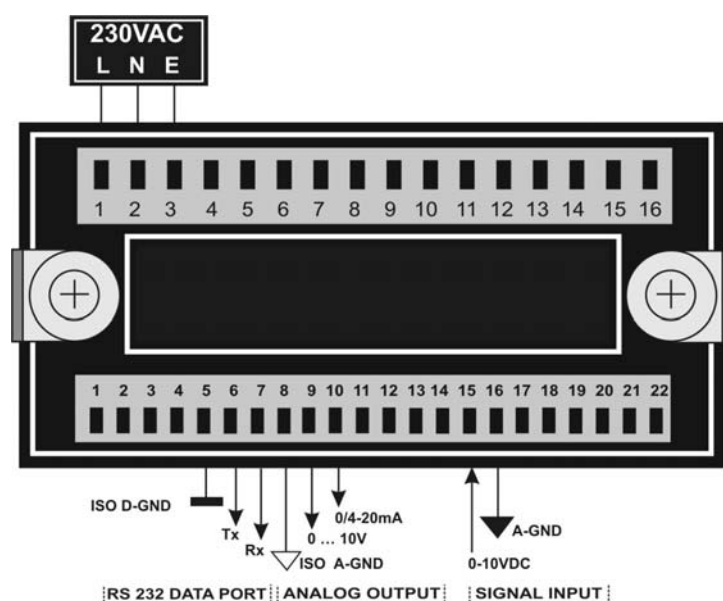
### 6.1 Analog Outputs

The analog outputs 4-20mA and 0-10V are generated simultaneously and are isolated from the input and the supply. They can be assigned to any two display readings in the menu steps **AOUt L** and **AOUt H** and can be selected for direct acting or inverting in the menu step **OUtAnI**. The resolution is 12 bit.

### 6.2 Serial Data Port

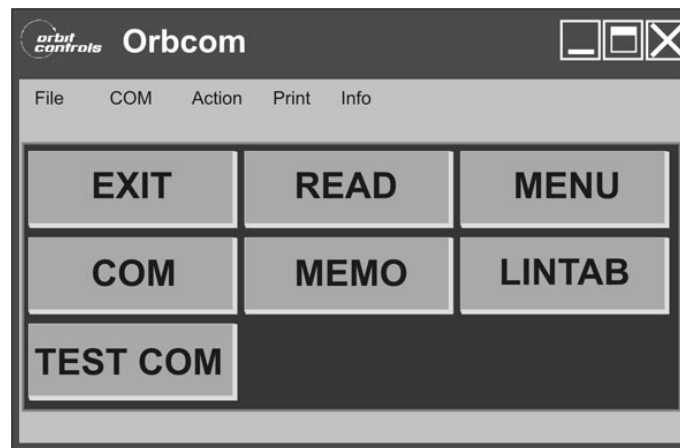
The serial data port is used for communication with the PC. The linearizing tables can be generated at the PC and transferred to OC7167L. The communication is possible with the Soft Manager Orbcom. The Orbcom permits also the measured display results to be transferred from OC7167L to the PC and stored under Windows. In order to communicate properly, the parameters of the data port of OC7167L and the Orbcom have to be set identically. The serial data port is selected in the menu step **rS SEL** when the address is set to **0**.

## 7 TERMINALS



## 8 SOFTMANAGER Orbcom

**Orbcom.exe** start



The keys in Orbcom can be activated with the mouse:

### Main Keys

EXIT	closes the program and returns to Windows
READ	reads the momentary displayed values of the OC7167L
MENU	parameters from OC7167L memory can be read and modified
COM	communications parameters: Baud, RS, Address, COM
MEMO	parameters from internal memory. <u>It is disabled with OC7167L</u>
LINTAB	Linearizing table
TEST COM	data transmission from PC to the instrument. <u>It is disabled with OC7167L</u>

### Auxiliary Keys

<u>F</u> ile	<u>O</u> pen <u>L</u> intab	opens the linearizing table
	<u>S</u> ave Lintab	saves the linearizing table
	<u>O</u> pen Menu	opens the file with all parameters, e.g. <b>OC7167L.men</b> .
	<u>S</u> ave Notes	saves notes
	<u>E</u> xit	closes the program and returns to Windows
<u>C</u> OM	<u>S</u> el COM	selects the communication COM
	<u>R</u> S SEL	selects the data port
	<u>B</u> aud	Baud Rate
	<u>A</u> ddress	Address (0 = RS232), (1 ... 31 = RS485)
<u>A</u> ction	<u>M</u> enu	Menu parameters
	<u>R</u> ead	reads the display results
	<u>N</u> otes	opens the file NOTES
	<u>M</u> emo	opens the file MEMO
	<u>L</u> intab	opens the linearizing table
	<u>T</u> est Com	transmits data to instrument. <u>Not available at linearizers.</u>
<u>P</u> rint	<u>P</u> rint Notes	prints the NOTES
	<u>P</u> rint <u>L</u> intab	prints the linearizing table
<u>I</u> nf	<u>A</u> bout	Info

## 9 COMMUNICATION

Click with the left mouse key at **COM** in the **Orbcom** window. The window **COM Port Set** opens.

In order to communicate properly, the parameters of the OC7167L data port and the Orbcom have to be set identically. The serial data port **RS232** of OC7167L is selected in the menu step **rS SEL** when the address is set to **0**. The baud rate can be set in the menu step **bAUd**.

COM Port Set

**Baud**

- ☐ 1200
- ☐ 2400
- ☐ 4800
- ☒ 9600
- ☐ 19200
- ☐ 38400
- ☐ 57600
- ☐ 115200
- ☐ 128000
- ☐ 256000

**RS**

- ☒ RS 232
- ☐ RS 485

**Address**

- ☒ 0
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8

**COM**

- ☐ COM 1
- ☒ COM 2
- ☐ COM 3
- ☐ COM 4
- ☐ COM 5
- ☐ COM 6
- ☐ COM 7
- ☐ COM 8
- ☐ COM 9

OK Cancel

Timeout

Slider bar showing a value between 0 and 100, with the slider positioned at approximately 5-10% from the left.

All parameters in **COM Port Set** must be set.



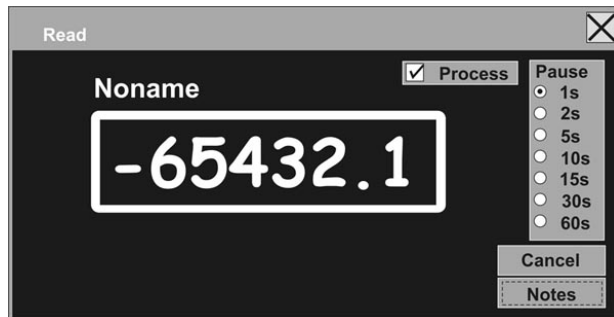
### Important

- The Baud Rate of OC7167L and the Baud Rate of COM Port Set must be set identically e.g. 9600 bd, RS232.
- RS232 with address 0 has to be selected
- COM of the PC has to be selected
- Time Out to be set to approx. 5-10% from left.
- Confirm with OK.



## 9.1 Transmission of Measurements to PC

Click with the left mouse key at **READ** in the **Orbcom** window. The window **READ** opens.

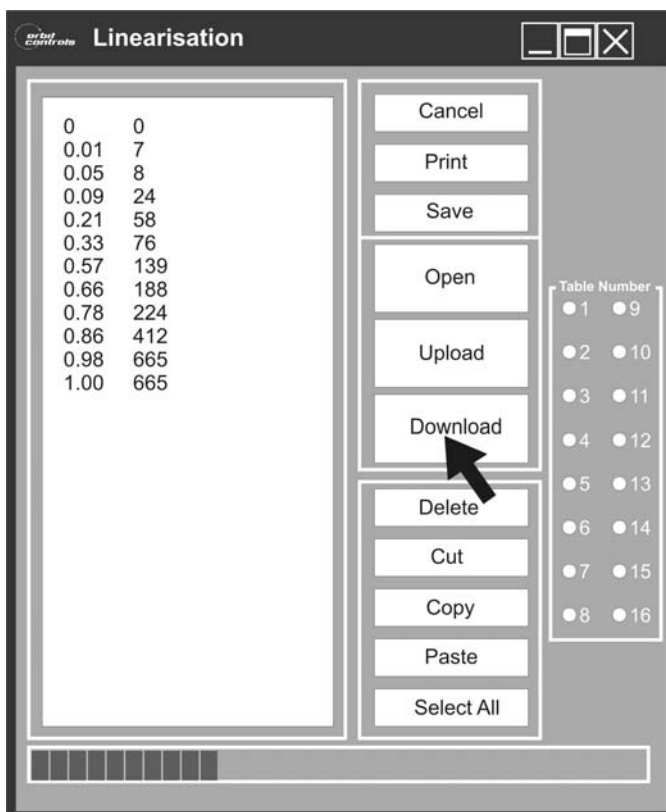


- **Pause** select and **Process** activate
- The display reading appear in the window

## 10 LINEARIZING TABLE

Click with the left mouse key at **LINTAB** in the **Orbcom** window. The window **Linearisation** opens. The linearizing table can be created and send to OC7167L (DOWNLOAD) or the stored table in OC7167L can be transferred to the PC and stored there (UPLOAD).

The linearizing table is generated in a text format. It can also be imported from a text editor, e.g. Excel. The table must contain a minimum of 4 points, max. 101 points. Each point contains X and Y coordinates. X is the input signal; Y is the corresponding linearized value. When less than 101 points are set, the used points are linear interpolated.



Four linearizing points have to be used as a minimum.

## 10.1 Keys

### Download

The linearizing table is transmitted from the PC to OC7167L. During the transmission IFACE is shown at the display. When the transmission is finished, the instrument switches into the measuring mode with the stored linearizing table.

### Upload

The linearizing table stored in OC7167L is transferred to the PC and appears in the window **Linearisation**.

### Open

This key opens the file in which the linearizing table is stored. The tables are written in text editor, e.g. Excel.

### Save

The linearizing table can be stored in text format in a selected file.

### Delete

Delete all data entry.

### Copy, Paste

With these commands the table (or part of it) can be copied and inserted.

### Print

The linearizing table will be printed out from the PC printer.

### Cancel

The linearizing table is closed.

## 10.2 Linearizing methods

Two linearizing methods are available in the OC7167L menu, **tAb** and **EqdtAb**. Each table point contains the X (input signal) and the Y (display) coordinates. The table **tAb** can be created upon demand with no respect to the distance between two consecutive X coordinates. The table **EqdtAb** is based on an equidistant X increments. This means that the X coordinates have to have the same increment value between each other. The analog output created with **EqdtAb** is much faster since the microcontroller doesn't have to calculate the X coordinates.

### Examples

<b>tAb</b>		<b>EqdtAb</b>	
0	0	0	0
0.01	5	0.10	80
0.25	115	0.20	105
0.50	280	0.30	180
0.66	200	0.40	220
0.75	200	0.50	220
0.80	500	0.60	180
0.85	550	0.70	190
0.90	780	0.80	500
0.99	900	0.90	780
1.00	900	1.00	900

### **ANALOG OUTPUT**

Response time of the generated analog output:

tAb                      9ms

EqdtAb                5ms.

### 10.3 X COORDINATES (Input Signal)

The internal measuring range of the microcontroller is 0 ...1V. The input signal range is made upon the customer requirement, e.g. 0...10V. When the linearizing table is created, the internal measuring range of 0...1V has to be considered with X coordinate increments of 0.01V. The linearizing table can directly be written into the window **Linearisation**, or created in a text editor and imported with the key **Open**.

#### Example

Input Signal: 0-10V non linear  
Table X points: 0; 0.01; 0.02; ... 1.00. Minimum 4, maximum 101 points can be used.  
Linearizing: 0 - 414 according to the table bellow.

Since the X increments are not equidistant, the linearizing table **tAb** has to be used.

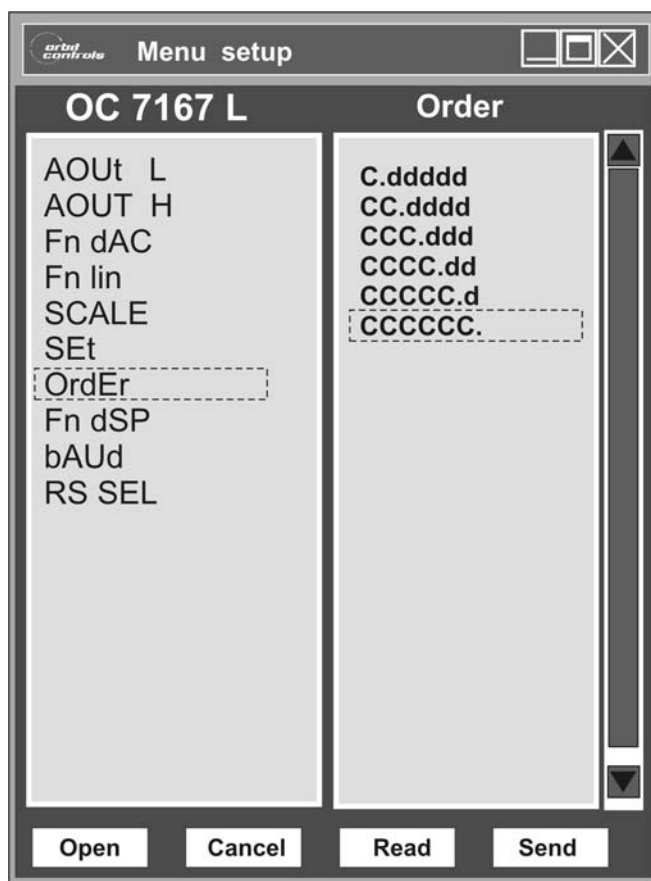
Input (V)	X (V)	Y (Display)	
0	0	0	first table point = zero point
100mV	0.01	7	
200mV	0.02	25	
800mV	0.08	25	
1V	0.10	125	
3.5V	0.35	333	
5V	0.50	523	
6V	0.60	412	
8V	0.80	398	
9.9V	0.99	414	last table point = max. used point
10V	1.00	414	table end point, termination of the table

It is recommended to determine the end point defining the maximum value the input signal can arrive at, as shown at the table above: 1.00 = 414.

## 10.4 Menu Setup

The Linearizer OC7167L can be controlled from the PC via the serial data port. Click with the left mouse key at **MENU** in the **Orbcom** window. The window **RMENU Setup** opens.

The left window displays all menu steps of OC7167L. When one of the menu steps is activated with the mouse, its parameter appears in the right window. This parameter can be set, overwritten or selected, depending on the parameter structure. When the new parameter value or selection has to be stored in OC7167L, double click on it or on the key **SEND**. During the transmission **IFACE** is displayed.



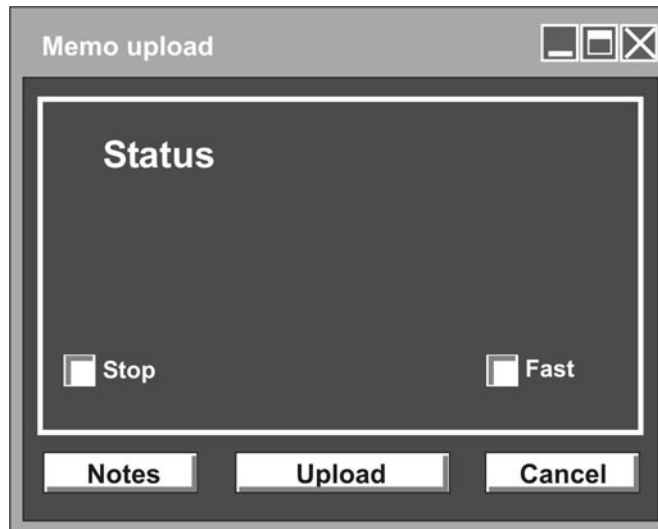
### IMPORTANT



When the baud rate or the address has been changed, transmitted and stored in OC7167L, the transmission will be interrupted. The reason is that the parameters of the instrument are now not identical with the parameters of the PC.

## 10.5 Memo Upload (not active in OC7167L)

The function **Memo upload** is not active in OC7167L. It is however mentioned here while this position appears in Orbcom.



<b>Upload</b>	Starts the data transmission from the instrument to the PC.
<b>Fast</b>	Increase of the transmission speed.
<b>Stop</b>	Stops the data transmission.
<b>Notes</b>	When <b>IFACE closed</b> appears, the data can be read when clicked at NOTES.
<b>Status</b>	Displays the actual status of the transmission.
<b>Cancel</b>	Closes the window and returns to previous window.

All this functions are disabled in OC7167L Linearizer.

## 11 CALIBRATION

The analog input has been calibrated during the production. If a recalibration is required, follow the next steps. The calibration for input range 0-10V is described:

Set **Lin** in the menu step **Fn Lin**.

Set **SCALE = 1**

Set **OrdEr** to **CCC.ddd**

Apply 0 V to the input and adjust ZERO potentiometer for display changing 0.000 and 0.001.

Apply 10V (0.01%) and adjust F.S. potentiometer for display changing 1.000 and 0.999.

Repeat the two steps until the instrument is calibrated.

Change into **tAb** in the menu step **Fn Lin**.

Change **OrdEr** to **CCCCC**.

The instrument is ready for linearizing.

